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COLONIZATION OF EUROPEAN CORN BORER PARASITES IN 1939

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During the 1939 season a total of 81,452 adult parasites, including Chelonus annulipes Wesm., Macrocentrus gifuensis Ashm., Inareolata punctoria Roman, Lydella grisescens R.D., and Phaeogenes nigridens Wesm., were shipped for release against the European corn borer (Pyrausta nubilalis Hbn.) in the United States. The total number actually released was 80,694, of which 75,026 were the egg-larval parasite C. annulipes.

The mortality in all shipments was 758 adults, or 0.9 percent of the 81,452 handled. The highest average mortality for any species (5.3 percent) occurred, as previously, with the delicate braconid M. gifuensis. The mortality in the large shipments of C. annulipes was 0.6 percent. There was no mortality in the transfer of I. punctoria, L. grisescens, or P. nigridens, but these parasites were taken only a short distance by car from the Moorestown, N. J., laboratory.

All shipments were made in screen-sided metal cans wrapped in wet cloth, with 250 adult parasites per can. Consignments of Chelonus annulipes to the eastern or multiple-generation area were sent in iced shipping containers by railway express from the Toledo, Ohio, corn-borer laboratory. Shipping containers utilized are described in Bureau of Entomology and Plant Quarantine ET Circular 77. Shipments other than those of C. annulipes to the eastern area were made in iced containers transported by automobile.

In previous years the cloth-wrapped cans had been placed in individual corrugated cardboard cartons. In 1939 this carton was dispensed with for all shipments of C. annulipes from Toledo, thus reducing weight and space requirements. That no harmful effect resulted from the omission of the corrugated cartons is evidenced by the low mortality sustained by this species.

Table 1 lists the parasite shipments made in 1939 and gives the mortality for each shipment.

Table 1.--Shipments of corn-borer parasites for release during 1939

Species	Parasites shipped	Date of shipment	Destination	Mortality
	Number			Percent
P. nigridens---	33	April 27	Burlington, N. J.	0
L. grisescens--	60	June 16	do	0
Do-------	60	21	do	0
C. annulipes---	9,000	9	Springfield, Mass.	0.7
Do-------	12,000	13	do	.7
Do-------	13,000	16	do	.4
Do-------	14,000	19	do	.6
Do-------	8,000	21	North Philadelphia, Pa	.5
Do-------	15,000	26	do	.9
Do-------	4,500	29	Indiana	.5
M. gifuensis---	1,190	July 1	Atlantic, N. J.	3.9
Do-------	883	6	do	1.8
Do-------	225	14	do	1/ 25.8
Do-------	625	Aug. 16	Burlington, N. J.	0
Do-------	2,065	23	Kingston, N. Y.	7.9
Do-------	385	29	Burlington, N. J.	0
I. punctoria---	176	5	do	0
Do-------	153	8	do	0
Do-------	97	16	do	0
Total-------	81,452	--	--	--
Average mortality:	--	--	--	0.9

1/ Mostly old parasites accumulated at laboratory.

The major emphasis in the corn borer parasite colonization program for 1939 was placed on an attempt to establish the egg-larval parasite Chelonus annulipes Wesm. in two districts where the corn borer has been particularly abundant and has caused considerable damage. These were the Connecticut and the Quinnipaac River Valleys in Connecticut[1/] and the Hudson River Valley, south of Albany in New York State.

A colonization program was devised, involving releases of this parasite at 4- and 5-mile intervals throughout the districts chosen. This method of colonization, a departure from the single-colony type usually employed for releases of corn borer parasites, was selected after consideration of the habits and reactions of the parasite, both in Europe and the United States. In northern Italy, the region from which C. annulipes was imported, its distribution is extremely uneven. It is abundant in certain localities and absent in others a short distance away. In the vicinity of Taunton, Mass., the area of continuous parasitization has increased in size and within this restricted area parasitization by C. annulipes compares favorably with that produced by other parasites of the corn borer. However,

1/ Geologically the old Connecticut River Valley, extending from the Massachusetts State line to Hartford, Conn., thence southwest to Long Island Sound. The Connecticut River now flows from south of Hartford in a general southeastward direction to the sound.

at the actual points of release, which are within 10 miles of the center of the area in which the parasite is now well established, no parasites have been recovered.

These observations indicate that Chelonus annulipes can exist only in more or less restricted ecological areas and that the success of colonization attempts depended to a large extent on whether or not the release was made near the more favorable part of one of these areas. As the factors which limit this parasite to specific areas were not readily determinable; and in order to establish the practical utility of close colonization as a measure conducive to more rapid build-up of parasite populations than that obtained by dispersion from widely separated release points, the colonies in the 1939 release areas were so closely spaced that there would be a high probability of locating 1 or more colonies near the center of favorable ecological islands, should any be present in the region. During the season 48 releases, totaling 47,724 parasites, were made in Connecticut and 23 releases, totaling 22,826 adults, were made in the Hudson River Valley, N. Y.

In order to test the effects of climatic changes experienced during recent years and the influences that might result from the prevalence of a two-generation strain of the borer in the Lake States, 4 colonies totaling 4,476 adults of C. annulipes, were released in northeastern Indiana.

Field examinations made at the time of the releases of C. annulipes in the lower Hudson River Valley showed that, although host eggs were still present in small numbers in the fields, the releases here were later than optimum for good synchronization. This probably was also true for the releases of this species in Indiana, where information received from State officials indicated that the peak of host oviposition occurred about June 26, although the parasites were not released in this district until June 29. All other releases appear to have been very well synchronized with the presence of the borer in a favorable stage for attack. The synchronization of the large releases of C. annulipes in Connecticut with the presence of corn borer eggs was particularly satisfactory, host eggs being present in unusually large numbers. All adults of Chelonus annulipes released consisted of individuals bred on Ephestia kuehniella Zell. at the Toledo, Ohio, corn borer laboratory. The original breeding stock of the parasite was obtained from corn borer larvae collected at the point where this parasite is now well established in southeastern Massachusetts.

The polyembryonic parasite Macrocentrus gifuensis Ashm., which attacks youn corn borer larvae, is well established in a locality in eastern Massachusetts and it was desired to extend the distribution of this species, although no large-scal program was attempted. Colonies of 1,902 and 2,177 adults were released at Kingston, Ulster County, N. Y., and in Atlantic Township, Monmouth County, N. J. Smaller releases were made in Burlington Township, Burlington County, N. J., where this parasite had been released previously. The adults of M. gifuensis released during the first half of July were reared from borers collected in Massachusetts in the spring of 1939 to supply this parasite. The parasite releases made in August against the second generation of the borer were made possible by parasites obtained incident to parasite-field-status studies at Taunton, Mass., on the first generation of the borer.

Releases of small numbers of the ichneumonid Inareolata punctoria Roman, the tachinid Lydella grisescens R. D., and the pupal parasite Phaeogenes nigridens Wesm. were also made at the Burlington, N. J., parasite-release site.

The releases of adults of Chelonus annulipes by States, counties, and townships are listed in table 2. Similar data relative to all other parasites released in 1939 are presented in table 3.

Table 2.---Liberations of Chelonus annulipes Wesm. in the United States in 1939[1] by States

State and county	Township	Date of release	Parasites released	State and county	Township	Date of release	Parasites released
			Number				Number
Connecticut:				New York:			
Fairfield	Southport	June 10	996	Albany	Coeymans	June 22	999
	Stratford	10	1,992	Columbia	Germantown	28	994
Hartford	Berlin	20	994		Greenport	22	997
	Cromwell	20	991		Kinderhook	22	988
	E. Granby	20	995		Kinderhook	23	994
	E. Hartford	17	1,000		Livingston	28	989
	E. Windsor	17	996		Stockport	22	996
	Enfield	17	2,984	Dutchess	Clinton	28	993
	Farmington	20	991		Hyde Park	28	990
	Glastonbury	17	1,984		Poughkeepsie	28	983
	Manchester	17	1,000		Red Hook	28	1,965
	Rocky Hill	20	995		Rhinebeck	28	987
	Southington	20	986	Greene	Athens	22	990
	South Windsor	17	1,993		Catskill	27	991
	Suffield	17	995		Coxsackie	22	998
	Suffield	20	1,995		New Baltimore	22	997
	Weathersfield	20	997	Ulster	Esopus	27	2,995
	Windsor	20	1,995		Kingston	27	995
Middlesex	Durham	14	1,986		Saugerties	27	1,985
	Guilford	14	986	Total	--	--	22,826
	Middletown	14	1,992	Indiana:			
New Haven	Branford	14	991	Adams	Union	June 29	1,246
	Cheshire	20	992	Allen	Jackson	29	1,238
	E. Haven	14	994	DeKalb	Butler	29	995
	Hamden	10	1,983	Noble	Washington	29	997
	Meriden	14	988	Total	--	--	4,476
	Milford	10	987				
	New Haven	10	996	Grand total: all States:	--	--	75,026
	N. Branford	14	2,987				
	N. Haven	10	992				
	Orange	10	994				
	Wallingford	14	990				
	Wallingford	20	1,987				
Tolland	Ellington	17	1,000				
	Somers	17	1,000				
Total	--	--	47,724				

[1] For previous releases of European corn borer parasites in the United States see The Insect Pest Survey Bulletin, Vol. 18, Supplement to No. 9, 1938.

Table 3.--Liberations of European corn borer parasites other than Chelonus annulipes in the United States in 1939, by States

State and county	Township	Date of release	Parasite species released: Macrocentrus gifuensis	Inareolata punctoria	Lydella grisescens	Phaeogenes nigridens
			Number	Number	Number	Number
New Jersey:						
Burlington	Burlington	April 27	--	--	--	33
	do	June 16	--	--	60	--
	do	21	--	--	60	--
	do	August 5	--	176	--	--
	do	8	--	153	--	--
	do	16	625	97	--	--
	do	29	385	--	--	--
Monmouth	Atlantic	July 1	1,143	--	--	--
	do	6	867	--	--	--
	do	14	167	--	--	--
Total	--	--	3,187	426	120	33
New York:						
Ulster	Kingston	August 23	1,902	--	--	--
Grand total, all States	--	--	5,089	426	120	33